Claim 1, lines 14-15, are vague and indefinite because it is not clear whether each residue is required to be nonreactive, organic, linear, branched, cyclic, saturated or unsaturated, ***and*** aromatic or heteroaromatic, or only one of those limitations. It is noted that it is not possible to for a residue to be both linear and cyclic. The Examiner suggests adding --or-- between "unsaturated," and "aromatic" if the residues R are not required to meet each of the listed limitations, but rather only one.

Claim Rejections - 35 U.S.C. § 103

8. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

9. Claims 1-2, 9-12, 14-15, 17, 19, and 21-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Burns et al. (5,750,610) or Lentz (3,122,520).

Burns et al. and Lentz disclose a method of making organically modified lyogels with hydrophobic surface groups. Burns et al. and Lentz both provide a hydrogel, wash the hydrogel with an organic solvent to convert it into a organogel, contact the hydrogel with an organosilicon compound, and dry the hydrophobicized organogel. Burns et al. and Lentz teach that the hydrogel may be washed with an organic solvent prior to hydrophobicizing in column 7, lines 7-15 and column 3, lines 49-53, respectively. Both Burns et al. and Lentz teach that the organosilicon compound which hydrophobicizes the organogel silylates the surface (column 5, lines 5-7, and column 2, lines 63-67, respectively). In addition, Burns et al. teaches using

disiloxanes of formula I as the organosilicon hydrophobicizing compound, such as hexamethyldisiloxane in column 6, line 49; Lentz teaches using hexaethyldisiloxane at column 4, line 21. Finally, Burns et al. and Lentz teach drying at column 7, lines 3-6, and column 4, lines 55-57, respectively. While it is noted that Burns et al. or Lentz do not specifically teach forming an aerogel, the creation of an aerogel is only cited in the preamble of claim 1. It is noted that a preamble is generally not accorded any patentable weight where it merely recites the purpose of a process or the intended use of a structure, and where the body of the claim does not depend on the preamble for completeness but, instead, the process steps or structural limitations are able to stand alone. See *In re Hirao*, 535 F.2d 67, 190 USPQ 15 (CCPA 1976) and *Kropa v. Robie*, 187 F.2d 150, 152, 88 USPQ 478, 481 (CCPA 1951).

With respect to claim 9, neither Burns et al. nor Lentz teach the exact water content of the lyogel after it is washed, however both teach that the water is replaced with organic solvent. Therefore, the references generally teach that there is no water in the lyogel after washing, therefore meeting claim 9. As to claim 10, Burns et al. and Lentz teach that the organic solvent may be aliphatic or aromatic hydrocarbons (column 7 of Burns et al. and column 3 of Lentz). As to claims 14 and 15, Burns et al. and Lentz teach that the reaction with the organosilicon compound takes place in the presence of a catalytic amount of strong acid. With respect to claims 19 and 23, Burns et al. and Lentz teach that the organic solvent may be an alkyl orthosilicate (column 7, lines 35-49 and column 3, lines 66-75, respectively).

10. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Burns et al.

Burns et al. is cited for the reasons stated above. In addition, Burns et al. teaches hexamethyldisiloxane at column 6, line 49.

11. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lentz as applied to claim 1 above, and further in view of Burns et al.

Lentz is cited for the reasons stated above. Lentz teaches using hexaethyldisiloxane in its the silylating step, however the reference does not teach using hexamethyldisiloxane. It is noted that Burns et al. is directed to a similar hydrophobicizing process as Lentz. Burns et al. discloses using a silylating agent of hexamethyldisiloxane, among others. It would have been obvious to have substituted hexaethyldisiloxane with hexamethyldisiloxane in the process of Lentz with the expectation of similar results because the two compounds are chemically and functionally similar and because Burns et al. discloses using hexamethyldisiloxane in a similar process.

12. Claims 3-9, 16, 18, 20, and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Burns et al. or Lentz as applied to claims 1-2, 9-12, 14-15, 17, 19, and 21-23 above, and further in view of Frank et al. (5,866,027).

Burns et al. and Lentz do not teach preparing the silicate-type gels from an aqueous water glass solution. However, Burns et al. broadly teaches "[t]he method used to prepare the organosilicate-modified silica hydrosol is not critical and can be any of those known in the art"

(column 3, lines 66-67); Lentz broadly states "[t]he method used to prepare the sol is immaterial" (column 2, lines 28-29). Frank et al. discloses a method of preparing a silicate-type hydrosol by the process of claims 3-5 and 20 at column 4, lines 32-40, and column 3, lines 1-3.

Frank et al. also discloses adding fibers to provide mechanical stability and adding IR turbidity-promoting agents to reduce the radiative contribution to thermal conductivity (column 5, lines 22-25). It would have been obvious to have added fibers and/or IR turbidity-promoting agents to the gels of Burns et al. or Lentz in order to achieve the benefits of increased mechanical stability and/or reduced radiative contribution to thermal conductivity as taught by Frank et al.

Frank et al. teaches that it is advantageous to allow a gel to age before surface modification in order to increase gel firmness (column 2, lines 59-67). It would have been obvious to have aged the gel of Burns et al. or Lentz prior to performing the surface silylating step to gain the benefit of increased gel firmness. Frank et al. also teaches that the water content of the lyogel after washing is advisably less than or equal to 5% by weight, or preferably less than or equal to 2% by weight (column 3, lines 4-8). With respect to claim 16, Frank et al. teaches using trimethylchlorosilane as a preferred silylating/hydrophobing agent (see column 3, lines 59-64 and Examples). It would have been obvious to one of ordinary skill in the art to have used a mixture of Frank et al.'s preferred silylating/hydrophobing agent, trimethylchlorosilane, in combination with the preferred silylating/hydrophobing agents of Burns et al. or Lentz, with the expectation of similar and successful results.

Finally, as to claim 18, neither Burns et al. nor Lentz specifically teach subcritically drying the surface-silylated lyogels. Frank et al. teaches subcritically drying the silylated gel of its invention by varying the temperatures and pressures. Burns et al. also teaches that drying may be conducted by both heating and reducing the pressure of the gel (column 7, lines 1-6). It would have been obvious to have subcritically dried the lyogels of Burns et al. or Lentz by the method taught by Frank et al. with the expectation of successful results because the references are all similarly related to silicate-type lyogels.

Conclusion

13. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Burns et al. (5,708,069) is cited as its disclosure is similar to Burns (5,750,610). GB 783,868 is cited as it appears to disclose a process similar to Burns et al. and Lentz as discussed above. Finally, Lutz (4,344,800) is cited to show the state of the art with respect to using a hydrophobe agent of hexamethyldisiloxane, however the agent is added prior to gelation of the gel synthesis mixture.

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kirsten Crockford whose telephone number is (703) 306-5461. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Shrive Beck, can be reached at (703) 308-2333. The fax phone number for the organization where this application or proceeding is assigned is (703) 305-3599.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

Steve Beck
Supervisory Patent Examiner
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kac KAC

October 17, 2000